Folk Apiculture of the Kayapó Indians of Brazil[1]

There are approximately 2500 Gê-speaking Indians in the Kayapó nation, composed of eleven widely dispersed villages in a two-million hectare *reserva indígena* in the Brazilian states of Pará and Mato Grosso. The data used in this paper were collected at Gorotire, the largest village (population approximately 600), during a 14-month field study conducted in 1977–78.

Initially the author became interested in the role of bees in the Kayapó culture because there was an extensive folk taxonomic domain and mythological corpus collected about social insects (Posey 1981a, 1982a). Social communities of *Hymenoptera* are thought to mirror Kayapó communities; indeed, it is believed that Indians learned how to live as social beings from an ancestral wise man (*wayanga*) who gained his knowledge from the study of bee, wasp and ant behavior (Posey 1978a). This belief serves the Kayapó as a social charter to continue their observations of nature in general and of *Hymenoptera* in particular and accounts for their reputation as keen ethologists (Posey 1979, 1980).

There is a practical component to the Kayapó's folk ethology: the nearly fanatic craving for honey sends men on long gathering trips to collect the flavorful substance. The Indians also prize the various types of waxes taken from bee hives. Waxes are used to caulk boats, coat cotton string and cord, to make numerous ceremonial objects, and are burned to produce smoke that repels insects, exorcise evil spirits, and cure illnesses. Smoke from burning wax is also used to entice the rains. Batumen is extracted from the nest structure and used as a resin for bow strings (Posey 1978b) and larvae and pupae are fancied as delicacies from certain species, as are the pollen cells (Table 1).

Frequently in folk biological studies, several taxonomic systems are superimposed and particular classification paradigms are employed depending on functional context (Gardner 1976). Thus, the Kayapó have various ways of classifying bees. One functional classification system is based on the aggressive behavior of bees when disturbed. There are four major divisions of behavior in this system: docile, stinging, biting, and blister-causing. There are only two "stinging" bees present, the European and the hybrid Brazilian bee (*Apis mellifera*); the rest of the "folk species" are stingless *Meliponidae*.

Interestingly, the hybrid "Brazilian bee" is carefully studied by the Kayapó. The Indians claim the bee arrived in Gorotire during the period of the full moon in February 1966. The Indians admire the agressiveness of the bee and its high productivity of thick honey, but they insist it invades the nests of native bees. They claim that the availability of the native, stingless bee honey has been greatly reduced because of the colonizing success of the hybrid, stinging bee over the native stingless species. Another functional taxonomic system is based on honey-related variables: taste, acidity, quantity found in one nest, time of the year the nest can be raided, etc. (Posey 1981b).

A morphological taxonomic system also exists, but the ability of the Indians to identify bees out of the ecological niche is generally unreliable. Out of a village population of approximately 600, the author found only two bee "experts" who were reasonably consistent in identifying folk species from morphological characteristics alone. Since the collection of honey and wax rests solely within the male cultural domain, women know little about bees (Posey, 1983).

A few species (*Apis mellifera*, *Melipona rufiventris flavolineata*, and *Trigona dallatorreana*) are widely known by men and women and can even be identified away from their nests. These species are recognized by general morphological features like body color, markings, and relative size. There is also an elaborate system of bee classification based on nest structure and location. The Kayapó recognize eight ecological zones and associate certain species of bees with each zone (Posey 1982b). Nests are grouped by: nest site (in a tree, in the earth, in vines, in abandoned termite hills, etc.); the height of the nest from the ground; the shape and size of the entrance tube (length, shape, markings, size, etc.); and nest size (based on gross size, relative amount of honey per nest, etc.). These criteria correlate with Willie and Michener's (1973) descriptive classification.

Nests are raided using strategies consistent with the aggressive nature of the species. For the most violent (*akrẽ*), fire and smoke are used to expel the colony before the nest is opened. If the nest is high up in a tree, the entire tree will be felled in order to get to the nest. For less aggressive species (*wajobôre*), the Indians tackle the nest with axes and bare hands despite clouds of furious, swarming insects. To me, having eyes, ears, and nostrils filled with tiny bees is maddening, but the Kayapó seem hardly to take note, so dedicated are they to the quest for honey (Posey 1981b).

The Kayapó practice semi-domestication, or at least species manipulation of bees. They recognize six species (Table 2) whose nests can be raided, after which, if the queen and part of the brood chamber are returned to the

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TABLE 1. *Principal species of Apidae utilized by the Kayapó Indians.*

Kayapó name	Scientific name	Wax used #			Honey		Larvae eaten	Pupae eaten	Pollen eaten	Resin used	Aggressive*	Distinctive traits
		Util.	Cer.	Med.	Seasonal	Amount						
ngâi-pêrê-ỳ	*Apis mellifera*	✓	✓		all year	very much			✓		++++	Honey taken during New Moon
ngâi-ñy-tỳk-ti	*M. semiligra*	✓	✓	✓	dry seas.	average					++	Bee parts used for hunting magic
ngâi-kumrenx	*M. rufiventris*	✓	✓	✓	all year	average						Wax used for mẽ-kurôm
ngâi-re	*M. compressipes*	✓	✓	✓	all year	much						Has markings like the "anta"
ngâi-kàk-ñy	*Partamona* sp.											Wax used in magic to make enemy weak
mykrwàr	*Frieseomelitta* sp.	✓	✓	✓	all year	average	✓	✓	✓			
udjỳ	*T. amalthea*				dry seas.	average				✓		Bee parts mixed with urucú for hunting magic
kukraire	*T. dallatorreana*				all year	much			✓		+	Break off limb with nest and run to expel bees
mehnôrã-kamrek	*T. silipes*			✓	all year	little				✓		Has skinny eyes like jaguar
mehnôrã-tỳk	*Scaura longula*			✓	all year	little				✓		Used for jaguar hunting magic
kangârã-krã-kamrek	*O. tataira*	✓	✓	✓	all year	average	✓	✓	✓		+++	Cut entire tree to take honey
kangârã-krã-tyk	*Oxytrigona* sp.	✓	✓	✓	all year	average	✓	✓	✓		++	Bee causes blisters on skin
kangârã-udja-ti	*Oxytrigona* sp.	✓	✓	✓	all year	average	✓	✓	✓		+++	Bees used in hunting magic
kangârã-ti	*Oxytrigona* sp.	✓	✓	✓	all year	average	✓	✓	✓		+++	Wax used for mẽ-kruôm
mỳre	*T. pallens.*	✓	✓	✓	all year	average					+	Sometimes fell tree
ngôi-rênk	*Trigona* sp.		✓		all year	average						Live in termite nests
djô	*T. fuscipennis*	✓	✓	✓	all year	little						Live in termite hills
imrê-ti-re	*T. chanchamayoensis*				all year	little	✓	✓	✓			Live in ant nests
kukoire-kà	*Partamona* sp.				all year	average					+	Nests in termite nests
õ'i	*Tetragona* sp.				dry seas.	little						Very acidic honey; fell entire tree
tôn-mỳ	*Tetragona* sp.	✓	✓	✓	dry seas.	average				✓		Fell tree to take honey
ri	*Tetragona* sp.	✓	✓	✓	all year	much				✓		Bee thought to be "stupid" and weak
mehr-xi-we'i	*Tetragona goettei*	✓	✓	✓	all year	average						Found only in the Xingú
mẽnire-udgà	*T. quadrangula*	✓	✓	✓	all year	average						Opening of nest like a vagina
mehnôdjành	*F. varia*			✓	dry seas.	little				✓		Smoke from wax used for curing
mehñykamrek	*T. spinnipes*	✓	✓	✓	dry seas.	little	✓	✓	✓		+	Wax burned; smoke causes dizziness
mehñy-tyk	*T. banneri*	✓	✓	✓	dry seas.	little					+	
pyka-kam	*T. fulviventris*	✓	✓	✓	dry seas.	little				✓	+	Bee deposits drops of resin on skin

* Nests of Aggressive (++++=very aggressive; +++=moderately aggressive; ++=slightly aggressive) bees are mined using smoke and fire to expel bees first. # wax use: Utilitarian; Ceremonial; Medicinal.

TABLE 2. *Semi-domesticated (manipulated) species of APIDAE utilized by the Kayapó.*

Kayapó name	Scientific name
Ngài-pêrê-ỳ[a]	*Apis mellifera*
Ngài-ûy-tyk-ti[a,b]	*Melipona seminigra* cf. *pernigra* (Moure and Kerr)
Ngài-kunurenx[a,b] (melin-krak-krak-ti)	*Melipona rufiventris flavolineata* (Friese)
Ngài-re[a]	*Melipona compressipes* cf. *fasciculata* (Sm.) or *affinis* Moure Ms.
nykrwât[a]	*Friesomelitta* sp.
udjỳ[a,b]	*Trigona amalthea* (Olivier)
kukraire[a,b]	*Trigona dallatorreana* Friese
mehnôrã-kamrek[c]	*Trigona cilipes pellucida* (Ckll.)
mehnôrã-tyk[c]	*Scaura longula* (Lep.)

[a] These species are systematically raided in subsequent seasons.
[b] Those species whose nests are taken to the village.
[c] Those species that are encouraged to build nests in dry posts in the houses.

TABLE 3. *Species of APIDAE found in the Gorotire (Kayapó) collection.*

Family, genus, species	(collection code number[a])
ANTHOPHORIDAE	
Xylocopa (*Schoenherria*) *dimidiata* Latr.	(540-2)
X. (*Schoenherria*) *lucida* Smith	(112-1)
X. (*Schoenherria*) *anthophoroides* Smith	(507-1)
X. (*Megaxylocopa*) *frontalis* (Oliver)	(540-1)
Centris (*Centris*) *inermis* Friese	(442, 479-6)
C. (*Centris*) *flavifrons* (Fab.)	(sem no-1)
C. (*Centris*) *aenia* Lep.	(sem no-1)
C. (*Centris*) *spilopoda* Moure	(117-1)
C. (*Paranisia*) *similis* (Fab.)	(442-2)
C. (*Paranisia*) *dentata* Smith	(442-3)
C. (*Trachina*) *longimana* (Fab.)	(540-2)
C. (*Heterocentris*) *bivornata* Mocs.	(103, 104-2)
C. (*Centris*) sp. 1	(111-1)
C. (*Paranisia*) sp.	(35-1)
C. (*Hemisiella*) sp.	(105-1)
C. (*Melanocentris*) sp.	(119, 120, 118-3)
Mesoplia sp. (parasita)	(278-1)
Mesomychium asteria (Smith) (parasita)	(603-1)
Tetrapedia sp.	(222-1)
HALICTIDAE	
Halictus hesperus (Smith)	(88-2)
Neocorynura sp.	(280-1)
Augochloropsis sp.	(451-1)
MEGACHILIDAE	
Megachile brasiliensis DallaTorre	(99-1)
M. (*Austromegachile*) sp.	(98-1)
M. (*Cryptauria*) sp.	(107-1)
M. giraffa Schrottky	(97-1)
Megachile sp. 3	(331-1)
Megachile sp. 2	(101-1)
Megachile sp. 3	(532-1)
APIDAE	
Bombinae	
Euglossini	
Eulaema (*Eulaema*) *meriana* (Olivier)	(540-2)
Apinae	
Apis mellifera (L.)	(218, 109, 106, 110, 108, 340)
Meliponinae	
Meliponini	
Melipona rufiventris flavolineata (Friese)	(547-2)
M. tumupasae Schwarz	(331, 541, 332, 325-4)
M. seminigra cf. *pernigra* Moure & Kerr	(340-1)
M. compressipes cf. *fasciculata* (Smith) or *affinis* Moure Ms	(542-1)
Trigonini	
Paratrigona (*Paratrigona*) cf. *peltata* (Spinola)	(554-1)
Oxytrigona tataira cf. *flaveola* (Friese)	(555, 553-4)
Plebeia (*Plebeia*) *minima* (Gribodo)	(520-1)
Scaura (*Scaura*) *longula* (Lep.)	(sem no-1)
Cephalotrigona capitata femorata (Smith)	(509-1)
Trigona (*Trigona*) *spinipes* (Fab.)	(328-6)
T. (*Trigona*) *fuscipennis* Friese	(557, 89, 71-6)
T. (*Trigona*) *amalthea* (Olivier)	(343, 504, 475, 94, 343-2)
T. (*Trigona*) *fulviventris guianae*	Ckll. (466-1)
T. (*Trigona*) *chanchamayoensis* Schwarz	(44-1)
T. (*Trigona*) *pallens pallens* (Fab.)	(515-1)
T. (*Trigona*) *cilipes pellucida* (Ckll.)	(sem no-1)
T. (*Trigona*) *dallatorreana* Friese	(546, 473-3)
T. (*Trigona*) *branneri* Ckll.	(516-2)
Partamona (*Partamona*) *pseudomusarum* Camargo	(512-7)
P. (*Partamona*) cf. *cupira* (Smith)	(96-1)
P. (*Partamona*) sp. 1	(334, 356-2)
P. (*Partamona*) sp. 2	(581-1)
Nannotrigona (*Scaptotrigona*) *nigrohirta* Moure Ms.	(339, 550-5)
N. (*Scaptotrigona*) *polysticta* Moure	(342-3)
Tetragona (*Tetragona*) *quadrangula* (Lep.)	(432, 512-3)
T. (*Tetragona*) *goettei* Friese 1900	(436, 437, 435-9)
T. (*Tetragona*) *clavipes* (Fab.)	(522, 338-4)
T. (*Tetragona*) *dorsalis* (Sm.)	(536, 327, 506-11)
T. (*Tetragona*) sp.	(86-1)
T. (*Ptilotrigona*) *lurida* (Sm.)	(604-1)
T. (*Tetragonisca*) *angustula fiebrigi* (Schwarz)	(508-2)
Friesomelitta cf. *varia* (Lep.)	(519, 513-3)
Friesomelitta sp.	(85-1)
Friesomelitta cf. *modesta* Moure Ms.	(558-5)

[a] The Collection Code Numbers refer to specimens from the Gorotire collection that are now in the possession of J. M. F. Carmargo, Departamento de Biologia, Universidade Federal do Maranhão, 65.000 São Luiz, Maranhão, Brazil.

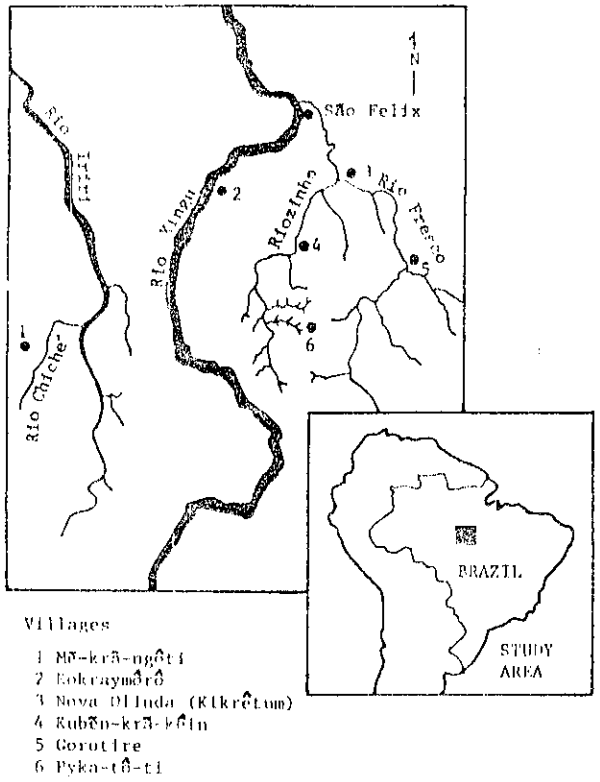

FIGURE 1. General geographic orientation of the Kayapó Indian villages of Central Brazil.

rest, the bees will return to re-establish the colony. Thus, there are trees (known by, and in a sense owned by, certain Kayapó men) that are consistently raided for honey and wax year after year.

The Kayapó also "keep" three species in or nearby their houses. The nests of certain *Trigona* (*T. dallatorreana* and another unidentified species) when found in the forest will be brought back on their attached limb and the complete nests installed in eaves of the houses. Other species (probably *T. amalthea* and *M. rufiventris*) are collected with the nests intact in hollow logs and the nests placed at the margin of the forest near the village or field clearing. Other species (*T. cilipes* and *S. longula*) tend to prefer building sites in exposed rafters of houses and are allowed to coexist with the household residents. The nests of all of these "kept" species are raided at prescribed times when the honey cache is known to be optimal.

Honey supplies are correlated with phases of the moon. When asked about the time a nest of particular species is ready to be raided, the answer is always given in relation to moon phases in the annual cycle.

The Kayapó also encourage the establishment of bee nests in their fields. To do this, they sometimes dig large holes or utilize existing armadillo holes. Into each hole they place rotting logs. Several undetermined *Trigona* species (including *T. fuscipennis* Friese) are attracted to the logs, and *Trigona fulviventris guianae* Ckll. nests directly in the earthen walls of the holes. The presence of bees is associated with crop success, although there is no clear notion of pollination *per se*.

In my collection of bees from Gorotire (Table 3), 56 folk species were discerned by the Kayapó. J. M. F. Camargo, Universidade Federal do Maranhão, São Luíz, identified the Gorotire collection. He found 66 scientifically recognized species of which 11 were unknown or as yet not described (one species of *Frieseomelitta*; two of *Partamona*; one of *Tetragona*; two of *Centris*; three of *Megachile*; one of *Mesoplia*; and one of *Tetrapedia*). Comparing folk and scientific species, therefore, we find an 86 percent correlation. Such high correlative quotients are common (Berlin 1973, Hunn 1975).

These data clearly point to the importance of bees to the Kayapó Indians of Brazil and other indigenous peoples.

It can be concluded that Indians are keen observers of nature, and often there is a high correlation between folk and scientific taxonomic systems. By extrapolation, one can argue that folk ethology is a field from which Western science can gain significant and insightful information about the nature of animal behavior as well as principles of human taxonomic and ecological systems.

Berlin, B. 1973. Folk systematics in relation to biological classification and nomenclature. Ann. Rev. Ecol. and Syst. 4: 259–271.

Gardner, P. 1976. Birds, words, and a requiem for the omniscient informant. American Ethnologist 3: 446–468.

Henn, E. 1975. A measure of the degree of correspondence of folk to scientific biological classification. American Ethnologist 2: 309–327.

Posey, D. 1978a. Ethnoentomology of the Gorotire Kayapó of Central Brazil. Ph.D. Dissertation, University of Georgia, Athens, Georgia (USA).

———. 1978b. Ethnoentomological survey of Amerind groups in lowland Latin America. The Florida Entomologist 61(4): 225–229.

———. 1979. Kayapó controla insectos com uso adequado do ambiente. Revista de Atualidade Indígena 3(14): 47–58.

———. 1980. Algunas observaciones etnoentomológicas sobre groupos amerindos en la América Latina. América Indígena 15(1): 105–120.

———. 1981a. Wasps, warriors, and fearless men: the cultural ecology of the Kayapó Indians of Central Brazil. Journal of Ethnobiology 1(1): 164–175.

———. 1981b. Apicultura popular dos Kayapó. Revista de Atualidade Indígena 20(1): 36–41.

———. 1982a. O conhecimento entomológico Kayapó: etnometodologia e sistema cultural. Anuário Antropológico (Universidade de Brasília, Brazil).

———. 1982b. The importance of bees to the Kayapó Indians of the Brazilian Amazon. Florida Entomologist 65(4): in press.

———. 1983. Keeping of stingless bees (Meliponidae) of the Kayapó Indians of Brazil. Journal of Ethnobiology. In press.

Wille, A. and C. Michener. 1973. The nest architecture of the stingless bees with special reference to those of Costa Rica. Revista de Biología Tropical 21 (Suplemento 1), p. 277.

Darrell A. Posey

Laboratório de Etnobiologia
A-C Departamento de Biologia
Universidade Federal do Maranhão
65.000 São Luís, Maranhão BRAZIL.